

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended): A system comprising:

a first storage unit system connected to a computer and having a first storage area and a first controller,

wherein the first storage area includes a first disk device and a first control information area, and

wherein said first control information includes first control information;

a second storage unit system having a second storage area and a second controller,

wherein the second storage area includes a second disk device and a second control information area, and

wherein said second control information area includes second control information; and

a third storage unit system connected to said first storage unit system and said second storage unit system and having a third storage area and a third controller,

wherein the third storage area comprises:

a queue area that stores journal information; and

a third control information area, said third control information area comprising a primary control information area and a secondary control information area.

wherein said first controller:

responds to a write request received from said computer to transmit to said third storage unit system a journal including write data received from said computer and address information indicative of a position in said second storage unit system at which said write data is to be written,

stores said write data in said first disk device, and

writes said journal to said queue area of said third storage unit system,

writes said first control information to said primary control information area, said first control information including a primary head position indicating a head position of data subjected to copying, and a primary size indicating a size of the data during copying, and

returns a response to said write request to said computer after transmitting said journal,

wherein said second controller:

~~receives first control information issued by said first controller and including a storage position of said journal used when said second storage unit system acquires said journal,~~

reads said first control information from said third storage unit system at regular intervals to determine whether there is new data to be copied,

copies said first control information as second control information into said secondary control information area, when said second controller determines that there is new data to be copied, and updates said second control information in said secondary control information area and said second control information area, said second control information including a secondary head position and a secondary size,

acquires said journal from said third storage unit system based on said first control information, and

stores said write data in said second disk device based on the address information included in said journal, and

wherein said first controller further:

reads said secondary head position and said secondary size in the secondary control information at regular intervals.

determines whether the first control information needs to be updated, and

updates said first control information in said first control information area, when said first controller determines that said first control information needs to be updated, and

~~wherein said journal further includes a sequence number, and said sequence number is used to check a dropout of said journal by said first storage unit system and said second storage unit system.~~

2. (previously presented): A system according to claim 1,
wherein said first storage unit system stores said first control information,
wherein said second controller acquires said journal and thereafter issues second control information indicative of the acquisition of said journal, and
wherein said first controller acquires said second control information and thereafter makes said first control information stored in said first storage unit system ready to be discarded.

3. (previously presented): A system according to claim 2,

wherein said first controller transmits said first control information to said third storage unit system and said second controller acquires said first control information stored in said third storage area from said third storage unit system, and

wherein said second controller transmits said second control information to said third storage unit system and said first controller acquires said second control information stored in said third storage area from said third storage unit system.

4. (original): A system according to claim 3, wherein said third storage unit system stores said first control information and said second control information in different logical volumes inside said third storage area, respectively, and makes such setting that a write request from either of said first and second storage unit systems is to be permitted in respect of each logical volume.

5. (previously presented): A system according to claim 3,
wherein in the event that a fault takes place in said first storage unit system,
said second storage unit system:

consults the first control information stored in said third storage unit system to acquire a journal having write data not stored in said second disk device from said third storage unit system, and

stores write data included in the acquired journal in said second disk device based on address information included in said acquired journal.

6. (previously presented): A system according to claim 5,
wherein when receiving a write request from a computer connected to said second storage unit system after a fault takes place in said first storage unit system,

said second storage unit system has difference information indicative of a storage position of write data written in accordance with said write request, and

wherein when said first storage unit system recovers from the fault, said second storage unit system transmits the data stored at the storage position indicated by said difference information to said first storage unit system through a communication path connecting said first storage unit system and said second storage unit system.

7. (previously presented): A system according to claim 2 further comprising:

a communication path connected to said first storage unit system and said second storage unit system,

wherein said first controller transmits said first control information to said second storage unit system through said communication path, and

wherein said second controller transmits said second control information to said first storage unit system through said communication path.

8. (original): A system according to claim 7, wherein when a fault takes place in said third storage unit system, said first controller transmits write data received from said computer to said second controller through said communication path, and said second controller stores the write data received through said communication path in said second disk device.

9. (previously presented): A system according to claim 3 further comprising:

a fourth storage unit system connected to said first storage unit system and said second storage unit system,

wherein when a fault takes place in said third storage unit system, said first storage unit system and said second storage unit system transmit/receive therebetween a journal, first control information and second control information through said fourth storage unit system.

10. (previously presented): A system according to claim 3 further comprising:

a fourth storage unit system connected to said first storage unit system and said second storage unit system,

wherein said first controller transmits a journal having time information to either of said third storage unit system and said fourth storage unit system, and

wherein said second controller acquires the journal from said third storage unit system or said fourth storage unit system and writes write data included in the acquired journal to said second disk device in order of times indicated by the time information assigned to said journal.

11. (currently amended): A remote copy method for use in a system having a first storage unit system connected to a computer and having a first disk device and a first control information area, wherein said first control information includes first control information, a second storage unit system having a second disk device and a second control information area, wherein said second control information area includes second control information, and a third storage unit system connected to said first storage unit system and said second storage unit system,

wherein the third storage area comprises a queue area that stores journal information, and a third control information area, said third control information area comprising a primary control information area and a secondary control information area, said method being executed among said first storage unit system, second storage unit system and third storage unit system and comprising:

a write request receiving step of causing said first storage unit system to receive a write request and write data from said computer;

a journal writing step of causing said first storage unit system to write a journal having said write data and address information included in said write request to said third storage unit system,

wherein said address information is indicative of a position in said second storage unit system at which said write data is to be written;

writing said journal to said queue area of said third storage unit system;

writing said first control information to said primary control information area, said first control information including a primary head position indicating a head position of data subjected to copying, and a primary size indicating a size of the data during copying;

~~a first control information issuing step of causing said first storage unit system to issue first control information including a storage position of said journal necessary for said second storage unit system to read said journal;~~

reading said first control information from said third storage unit system at regular intervals to determine whether there is new data to be copied,

copying said first control information as second control information into said secondary control information area, when said second controller determines that there is new data to be copied, and updating said second control information in said

secondary control information area and said second control information area, said second control information including a secondary head position and a secondary size;

a first control information acquiring step of causing said second storage unit system to acquire said first control information;

a journal reading step of causing said second storage unit system to read said journal based on said first control information; and

a write data writing step of causing said second storage unit system to store the write data included in said journal in said second disk device, in accordance with the address information included in said ~~journal~~journal;

reading said secondary head position and said secondary size in the secondary control information at regular intervals;

determining whether the first control information needs to be updated; and

updating said first control information in said first control information area, when it is determined that said first control information needs to be updated.

~~wherein said journal further includes a sequence number, and said sequence number is used to check a dropout of said journal by said first storage unit system and said second storage unit system.~~

12. (previously presented): A remote copy method according to claim 11, wherein said first storage unit system stores said first control information, and wherein said method further comprises:

a second control information issuing step of causing said second storage unit system to issue, after said journal reading step, second control information indicating that said second storage unit system reads said journal; and

a second control information receiving step of causing said first storage unit system to receive said second control information,

wherein said first storage unit system discards said first control information after receiving said second control information.

13. (previously presented): A remote control method according to claim 11,

wherein said first control information issuing step has a step of writing said first control information into said third storage unit system, and

wherein said first control information acquiring step has a step of reading said first control information from said third storage unit system.

14. (original): A remote copy method according to claim 13, wherein said third storage unit system stores said first control information and said second control information in different logical volumes inside a third storage area, respectively, and makes such setting that a write request from either of said first and second storage unit systems is to be permitted in respect of each logical volume.

15. (previously presented): A remote copy method according to claim 13 further comprising:

a step of causing, in the event that a fault takes place in said first storage unit system, said second storage unit system to acquire from said third storage unit system a journal having write data not stored in said disk device owned by said second storage unit system by consulting said first control information stored in said third storage unit system; and

a step of causing said second storage unit system to store, based on address information included in the acquired journal, write data included in said acquired journal in said disk device said second storage unit system has.

16. (original): A remote copy method according to claim 15 further comprising:

a step of causing said second storage unit system to receive a write request from a computer connected to said second storage unit system in the event that a fault takes place in said first storage unit system;

a step of causing said second storage unit system to hold difference information indicative of a storage position of write data written in accordance with said write request; and

a step of causing, when said first storage unit system recovers from the fault, said second storage unit system to transmit the data stored at the storage position indicated by said difference information to said first storage unit system through a communication path connecting said first storage unit system and said second storage unit system.

17. (previously presented): A remote copy method according to claim 11, wherein said first storage unit system and said second storage unit system are connected to each other by a communication path,

wherein said first control information issuing step has a step of causing said first storage unit system to transmit said first control information to said second storage unit system through said communication path, and

wherein said first control information acquiring step has a step of causing said second storage unit system to receive said first control information from said first storage unit system through said communication path.

18. (previously presented): A remote copy method according to claim 17, further comprising:

when a fault takes place in said third storage unit system:

a step of causing said first storage unit system to transmit write data received from said computer to said second storage unit system through said communication path; and

a step of causing said second storage unit system to store the write data received via said communication path in said disk device said second storage unit system has.

19. (original): A remote copy method according to claim 13, wherein said system further comprises a fourth storage unit system connected to said first storage unit system and said second storage unit system; and wherein when a fault takes place in said third storage unit system, said first and second storage unit systems transmit/receive a journal and first control information therebetween through said fourth storage unit system.

20. (previously presented): A remote copy method according to claim 13, wherein said system further comprises a fourth storage unit system connected to said first storage unit system and said second storage unit system,

wherein said journal writing step has a step of causing said first storage unit system to write a journal having time information to either of said third and fourth storage unit systems, and

wherein said second controller acquires the journal from said third and fourth storage unit systems and writes write data contained in the acquired journal to said second disk device in order of times indicated by said time information assigned to said journal.

21. (currently amended): A system comprising:

a first storage system connected to a computer and having a first storage area and a first controller, said first storage area including a first disk device and a first control information area.

wherein said first control information includes first control information;

a second storage system connected to a computer and having a second storage area and a second controller, said second storage area including a second disk device and a second control information area.

wherein said second control information area includes second control information; and

an intermediate storage system connected to said first storage system and said second storage system and having a third storage area and a third controller,

wherein the third storage area comprises:

a queue area; and

a third control information area, said third control information area comprising a primary control information area and a secondary control information area.

wherein said first controller;

writes to said intermediate storage system blocks of a write data received from said computer and a sequence number for each of said blocks, and writes said blocks to said first storage area,

writes said blocks to said queue area of said intermediate storage system, and

writes first control information to said primary control information area, said first control information including a primary head position indicating a head position of data subjected to copying, and a primary size indicating a size of the data during copying, and

wherein said second controller;

reads said first control information from said intermediate storage system at regular intervals to determine whether there is new data to be copied,

copies said first control information as second control information into said secondary control information area, when said second controller determines that there is new data to be copied, and updates said second control information in said secondary control information area and said second control information area, said second control information including a secondary head position and a secondary size, and

reads said blocks of said write data and said sequence number from said intermediate storage system, and stores said blocks of said write data to said second storage area, and

wherein said sequence number is used to assure a security of said write data between said first storage system and said second storage system by said first storage system and said second storage system, and

wherein said first controller further:

reads said secondary head position and said secondary size in the
secondary control information at regular intervals,

determines whether the first control information needs to be updated,

and

updates said first control information in said first control information
area, when said first controller determines that said first control information needs to
be updated.

22. (previously presented): A storage system according to the claim 21,
wherein after said second storage system receives an information including a
location of said blocks and said sequence number in said intermediate storage
system, said second storage system reads said blocks and said sequence number
from said location of said intermediate storage system and stores said blocks read
from said intermediate storage system to said second storage area.

23. (currently amended): A system comprising:

a first storage system connected to a computer and having a first storage
area and a first controller, said first storage area including a first disk device and a
first control information area, wherein said first control information includes first
control information;

a second storage system connected to a computer and having a second
storage area and a second controller, said second storage area including a second
disk device and a second control information area, and
wherein said second control information area includes second control

information;

an intermediate storage system connected to said first storage system and said second storage system and having a third storage area and a third controller,

wherein the intermediate storage system comprises:

a queue area that stores journal information; and

a third control information area, said third control information area comprising a primary control information area and a secondary control information area,

wherein said first controller;

writes to said intermediate storage system a journal having a write data received from said computer and a sequence number, and writes said write data to said first storage area,

writes said journal to said queue area of said intermediate storage system,

writes first control information to said primary control information area, said first control information including a primary head position indicating a head position of data subjected to copying, and a primary size indicating a size of the data during copying,

wherein said second controller;

reads said first control information from said intermediate storage system at regular intervals to determine whether there is new data to be copied,

copies said first control information as second control information into said secondary control information area when said second controller determines that there is new data to be copied, and updates said second control information in said secondary control information area and said second control information area, said

second control information including a secondary head position and a secondary size, and

reads said write data and said sequence number from said

intermediate storage system and stores said blocks of said write data to said second storage area, and

wherein said first controller further:

reads said secondary head position and said secondary size in the secondary control information at regular intervals,

determines whether the first control information needs to be updated,

and

updates said first control information in said first control information area, when said first controller determines that said first control information needs to be updated.

~~wherein said sequence number is used to check a dropout of said journal by said first storage system and said second storage system.~~

24. (previously presented): A storage system according to the claim 23, wherein after said second storage system receives an information including a location of said journal in said intermediate storage system, said second storage system reads said journal from said location of said intermediate storage system and stores said write data in said journal read from said intermediate storage system to said second storage area.

25. (new): A system according to the claim 1, wherein said journal further includes a sequence number, and said sequence number is used to check a dropout of said journal by said first storage unit system and said second storage unit system.

26. (new): A remote copy method according to the claim 11, wherein said journal further includes a sequence number, and said sequence number is used to check a dropout of said journal by said first storage unit system and said second storage unit system.

27. (new): A storage system according to the claim 23, wherein said sequence number is used to check a dropout of said journal by said first storage system and said second storage system.